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Needs of Texas

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THE NEEDS OF TEXAS.

(Interviews With Engineers, By E. Hutson.)

Introduction.

"TEXAS is a half-finished land," declared the grizzled, sunburned man, who sat with a grey felt hat hung on his knee, to his companion who was watching with the interested gaze of a stranger, the prairies glide past the car window.

"Really, I should like to know just what you mean by that expression," the other responded in tones unmistakably British.

"Why, that the Lord meant Texas to be a paradise and put the raw materials down here for old Mother Nature to carry out his plans; but she's a powerfully slow old party—thorough, like you English, but poky; so the Lord just called in the Texans to help finish the job a few thousand years sooner than the old lady could do it alone; and we are digging at it, but have only started a few small stunts so far. When we get warmed up to our work you'll see results that'll remind you of the things you used to read about when you were a little shaver in the old "*Arabian Nights.*"

"Fancy!" exclaimed the Englishman. "Do you know you surprise me! 'A half-finished land!' I never thought of it before. How very odd! And you propose to create a paradise out of it?"

"According to the good Lord's own plans and specifications," replied the other, whose eyes twinkled quizzically. "He let us in on the job when he allowed us to win the country a short while back—you may recall the little brush we had with Santa Anna's army a couple of generations ago. We took it for granted He meant for us to get to work here when He allowed things to come our way in that scrimmage and we've"—

"Do you refer to the war with Mexico?" asked the somewhat bewildered Briton.

"Of course, and as I was saying, we proceeded to get busy. But we are not as busy yet as we are going to be, because the world at large and even the Texans themselves have not begun to realize yet the needs of Texas."

"'The *needs* of Texas?' Now," argued the Englishman, "all the people I have talked with, the newspapers, the railway pamphlets, the real estate brokers, the officers of your business leagues, commercial clubs and population clubs are unanimous in discoursing of the *resources* of Texas, while they assure me that she has but two needs—population and capital."

"You haven't talked with any engineers—civil or mining, or hydraulic, or railroad?"

The other shook his head. "No!—Yes, I did meet a young surveyor in a land office in Houston and I recall that he told me that what South Texas needed was drainage; that if the cattlemen (who, he explained, were opposed to the new drainage law because it would make their land grow too costly to use for range purposes) could only be made to see how much their own industry would be helped by efficient drainage, their opposition would soon cease. He assured me that in the present undrained condition of the coast country a fortnight's rain at certain seasons would cause a deterioration estimated at a hundred thousand dollars in the value of stock, through loss of blood, loss of flesh, fever and deaths, due to mosquito bites alone."

"I don't doubt it," assented the Texan.

"You astonish me! I fancied that was one of your American jokes."

"It's no joke to the cattleman nor to his cattle. You'll think it's another joke when I tell you that if these farmers who, as you see (he pointed to a large pumping station that had been visible across the flat rice fields for some time) are spending thousands each year flooding their fields with water from these canals, would spend one-tenth of the money in draining the same fields they could increase their profits on rice, insure the safety of their crop, or if they chose, grow almost any other crop—cotton, sugar cane, truck or fruit—on those same lands, marshy as they seem now."

"You talk of drainage—are you an hydraulic engineer?"

"I suppose you might call me that, as drainage has been my hobby and irrigation my business for a dozen years. But I was trained for a civil engineer—got my sheepskin at Cornell after I finished up what they could teach me in one of our State schools; and I had about fourteen years surveying up and down the lines of the Southern Pacific before I left railroad work for irrigation. Thought I knew a good deal about Texas and about the science of engineering then, too; but I know what an ignorant fool I was. Irrigation is a science and an art itself, and a pretty smart sort of a civil engineer can make some expensive mistakes when he begins to dig canals. It is special skill, special knowledge, a study of the somewhat peculiar problems of her very various regions, that Texas needs today. Any engineer will tell you that."

"I should like for you to explain," said the Englishman, "why you call the problems of the Texas engineer peculiar. Are not engineering problems very nearly the same everywhere—in the Sahara, in Siberia, in Patagonia or in London? I mean are not the solutions of these problems worked out by the same underlying principles and rules?"

"Of course that is true in a general sense," answered the engineer, "but peculiar conditions will often force you to vary your methods so much that it is hard to recognize your underlying principles. I remember a crusty old engineer on the Santa Fe right-of-way who was in charge of a party building bridges and culverts 'way out towards San Angelo. That part of the country is a grassy prairie with long drouths and very heavy rains when it does rain. The mean annual rainfall figures very low indeed, but it is apt as not to come in a few tremendous showers at long intervals, and the open, unplowed country allows the water to run off more quickly than it would in cultivated lands of similar slope. My gruff old friend knew these facts and reckoned with them in view; but one of his party was a fresh youngster from the St. Louis office, full of college learning and of a desire to use the most modern labor-saving methods. So he suggested to the boss that they could save time by calculating the size of their culverts with the aid of the tables worked out in the St. Louis office for the whole Santa Fe System. So much water shed, so much rainfall, use such and such formulas to get the dimensions of your culvert. 'And, Mr. McGinnis,' he added, 'according to these formulas you are making your culverts unnecessarily large.' 'Formulas,' snorted old Matt McGinnis, 'Formulas are all right, maybe, in a civilized country, but out here the water is too darned uncivilized to know *how* to flow by formulas.' "

"How very singular," murmured the Englishman. "Fancy the water refusing to recognize the reign of natural law in that way."

"You run across queerer things than that in Texas sometimes," the engineer assured him. "When I first came out here and used to roam the country as a small boy, I would naturally follow the slope of the land when I or my pony grew thirsty, expecting to find water in a gully or a valley, but all the gullies were dry as a bone in summer, and at last I learned that to find water I must go up on the slope or near the crest of a hill where there was pretty sure to be a "tank" or pool of rain water hollowed out of the stiff clay soil, to water the stock, or else I would find a similar rain-water cistern at the *head* of the gully whose downward course I had searched for miles in vain."

"Fancy," breathed his companion. "But why should this be?"

"It is easily explained. The rains, when they do come, are so sudden, so violent, and so profuse that a tank at the foot of a hill, or one formed by draining a gully in mid stream, would soon be washed away."

"So your first experience of Texas engineering showed you how exceptional it must be."

"And I am still learning the same lesson. You see it is mainly due to the rawness, the literal newness of the land. People talk about the Southwest as a new and undeveloped country. But many 'new

countries' in that sense are actually and geologically old—'old as the everlasting hills'—far older than most settled countries. A few regions in Texas are old. Those mountains that crop out in the trans-Pecos region, for example, belong to the Rocky Mountain ridge I am told. But most of Texas is geologically young, new, raw; and needs the tempering of time or some artificial aging to perfect it."

"But why shouldn't a new country be as fit for human habitation as an older one? One would expect a virgin soil to be more fertile, more productive."

"I suppose it does contain all the elements of fertility, but not always in shape for use. You see we have to study nature's methods, and this is what she does: All her surplus land she keeps put away under the ocean, in soak for future use; and her rivers pour sand and silt on it, in alternate layers for thousands of years, building up a new soil; and sandwiched between the layers there's a vast amount of rotten seaweed and fish bones and shell, and all of it is saturated with salt. Plenty of plant food there when the old lady lifts it out of the water and begins to get it ready for use; but it isn't in shape to be easily digested and she works it over for several thousand more years in her thorough-going way. She's a capable engineer and a successful farmer, and we imitate her methods and merely gear up the machinery so as to hurry up her processes."

"What are her processes of preparing new lands?" inquired the Englishman.

"You can see them out of the window here. Here's a stretch of flat grass-covered prairie; it has not been long, comparatively speaking, since this lay at the bottom of the sea and the soil that is growing those 'blue-bonnets' and verbenas yonder, where you see patches of bright blue and lavender, was sand laid down by such a stream as the San Jacinto, while the mass of brilliant red over there is the 'Indian blanket' and the veil of white is a sort of wild parsley, and these are to be found on stiff, clay soils that were once the fine silt of a muddy river like the Brazos. You will not find the blue-bonnets except where the soil is somewhat sandy, nor the red-blankets where there is no clay. And year after year some prairies bloom with brilliant flowers while close by are stretches of grass that show neither red nor blue, except for a stray grass-star or iris. You ask why? It is a difference in the soil. All the old settlers will point out to you which are the 'grass prairies' and which the 'flower prairies.' So they have been since bison and Indians roamed them, like carpets of green with rugs of vivid Turkish patterns, red and blue, yellow and white and purple, as you see it yonder."

"It is very beautiful," said the Englishman, "but do you mean that all these patches of color are determined by the sort of soil beneath?"

"Almost altogether, though of course other causes come into play,

too; but the soil and its conditions, its wetness or dryness, its looseness or compactness, determine what shall grow on it. Yonder, for example, you see the expanse of grass broken by a group of trees. There is, I know without going there, a slight depression there; just a flat saucer that holds the rainwater from the surrounding land. I know, because I can see that those trees are sweet-gums. But the line of oaks we saw an hour ago was on a slight slope; while the cottonwoods and willows that are tinged with pale green and yellow over this other side (he pointed across to the opposite windows) are skirting a small stream or bayou."

"And the dark trees beyond them?" questioned the other.

"Are pines; and even at this distance I can see that they are long-leaf and not short-leaf or loblolly, and so I know the soil beneath them is well drained sand, not swamp."

"Then you think the land on which no trees grow will not support trees?"

"Not until the condition of the soil is changed by natural or artificial stirring, watering and draining. Cultivation is necessary, of course, in any soil, to produce any crop; but the point I want to bring out is this: In this new land, where Nature (whose farming and engineering operations preceded man's, and are on a stupendous scale of depth and thoroughness as well as of area and time) has not finished her task we must imitate as far as we can her methods and work out our problems in big figures.

"Instead of a land cultivated for ages by the growths of countless forests, by shifting streams and forests and sun and rain, we have a new raw soil, fresh from the ocean bed, full of plant food, no doubt, but full also of salts and other minerals not digestible by plants that are not specially adapted to absorb them. We find thick beds of stiff clay, almost impenetrable to the roots of most plants; or layers of sea-sand in which many plants would starve. Plowed and mixed and washed and mingled, with a quantity of organic matter added, all these elements would form a good loam for orchard or garden. But to plant them as they are, undrained and with only superficial cultivation, in pears, peaches and other highly civilized and delicate plants is as foolish as it would be to consult a callow law or medical student on a case of importance instead of an experienced practitioner. Yet this is just what hundreds of settlers have done in this very part of Texas; and yonder are the monuments of their folly—those barren pear orchards you see with deserted houses and large, empty barns of a type that proclaims their owners to have been Northern immigrants."

"Yet I understand some people have grown rich in these very regions," objected the Englishman.

"Yes, because they were prudent enough to imitate that shrewd old farmer, Nature. She has been tilling the soil a long time and she

doesn't plant roses or apples or strawberries on a half-salty marsh; she grows rank, succulent weeds there, as salty as dill pickles; in the sand-dunes she plants primroses and salt-cedar—you call it tamarisk, I believe. Then comes a crop of grass with tough, penetrating roots, to pierce the stiff clay. Meantime the ants and earthworms, moles and gophers are at work, tunneling and draining and airing the soil on a scale at once infinitely fine, and because of their number, tremendously wide. But neither plant roots nor worms nor moles can work very deep; and in these level lands the water-line is soon reached, below which no living thing can penetrate for lack of air. To remedy this Nature begins to plow and drain and irrigate; and for these purposes she uses one and the same effectieve instrument—a stream of water."

"Do I understand you to say she *plows* with water?" questioned the other.

"Yes, and plows deeper than any steel plow-share ever yet turned the soil. Water is her favorite instrument—a marvelous tool; with it you can cut, carve, polish, plow, spade, harrow, rake, winnow, sift, tunnel, split, or remove entirely any mass of material, great or small, of almost any hardness. And with the same tool you may build up, model, plaster and patch. We engineers use it—and Nature taught us how. Yonder, for example (he pointed to a stream they were about to cross) we shall see her at work with her plow. See, from this bank she cut off, in the flood last May, a great chunk of the stiff clay, which has fallen in mid-stream with its young willows still sprouting up; and already she is laying down the earth of which that chunk was composed on the opposite bank, half a mile down stream. You can see the red mud bank just beyond that cotton-wood tree. These winding streams that are nearly empty for a whole season and will swell to a torrent in twenty-four hours of rain, cut and crumble their soft banks very rapidly and deposit the soil with equal swiftness as their velocity is soon decreased. So they plow, as with a gigantic plowshare, a furrow as deep as their depth and as wide as their width; mixing sand and clay, crumbling and pounding and crushing hard lumps and washing out surplus and injurious salts."

"I never thought of a river as a plow before," mused the Briton, "but, bless me! I believe you are right."

"Then, the soil near the stream is thoroughly drained, as well as watered, so that deep-rooted plants, quite different from the grasses and prairie flowers, soon grow along the river banks: first, weeds and willows, then cotton woods: later magnolias, oaks and vines. As tributaries to the stream drain a larger and larger area and the forest-growth along its banks spreads, the earth grows richer with rotting leaves and lighter with penetrating roots, till a forest-loam is produced, such as we find in the river bottoms and in East Texas, capable

of producing the finest cotton, fruits and vegetables. Cultivation and drainage, on a tremendous scale, have done this; we must work on a similar vast scale, and prepare the land for men to dwell in. We engineers know this; we know the needs of Texas as few others do; and you will find it well worth your while, if you wish to learn something of the real conditions in Texas, to arrange to have a few interviews with engineers."

"Thanks," said the Englishman, "I will interview every engineer I meet on the needs of Texas."

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Lower Rio Grande Sorghum—Planted May 4, 1908, Photographed July 25, 1908.